CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

With the current global conditions where global warming is at its worst, natural resources depleting and energy supply is limited, efficient energy usage continues as a major concern. As more and more buildings are built to cope with the rising demand and population, buildings are now accountable to a major portion of the energy usage produced up to 40 % in most countries (WBCSD; 2012). Thus it is only logical that steps are taken to ensure that buildings built are energy efficient. To do this, building envelope of a development prior to construction shall need to be determined. Building envelope consist of components that separate conditioned spaces from unconditioned spaces or from outside air (Zafirol and Al-Hafzan; 2010). A building envelope includes all components of a building that enclose the conditioned space.

In Singapore, the general building thermal transfer value calculation was named Overall Thermal Transfer Value (OTTV) in 1979 (BCA; 2004) but was subsequently replaced and renamed with several more define models to suit different the development types namely RETV and ETTV. Using these calculations, the impact of building envelope composition can be determined.

Hence, comparing it to the total energy usage to maintain the building operation mainly the Total Cooling Energy (E_c) consumption, a correlation between the two shall give an indication of acceptable energy usage and range of energy efficient building. This is vital to determine parameters where new buildings can refer to as guidelines to achieve energy efficient buildings

In this dissertation, a particular medium scale mixed development case study in Singapore is used to determine the correlation between the ETTV of the building and the E_c consumption as there were no references found for development of this sort. Thus it is significant toward establishing a benchmark for medium scale mixed development in terms of building efficiency.

1.2 RESEARCH OBJECTIVES

Using a medium scale mixed development building as case study in Singapore where the building serve as both commercial and residential, the relevance of the formula for thermal transfer value for mixed development in Singapore can be better govern as the following objectives are established:

i. To determine the building Envelope Thermal Transfer Value (ETTV)
ii. To calculate the building Total Cooling Energy (E_c) consumption used for cooling.
iii. To develop the correlation between the Envelope Thermal Transfer Value (ETTV) and Total Cooling Energy (E_c) consumption for the case study building.

Based on the objectives of this dissertation, the impact of ETTV on the energy usage of the building for medium scale mixed development can be better appreciated. Thus efforts can be made to ensure that new buildings to be constructed to meet a more stringent guidelines for it to be more energy efficiency.

1.3 SCOPE OF THE DISSERTATION

Chapter 1 gives an introduction to building envelopes and the significance of building energy performance. The same chapter also indicates the objectives of this dissertation.

Chapter 2 gives brief literature review pertaining to the present investigation in accordance to the objectives of this dissertation.

Chapter 3, methodologies adopted to carry out the computation to meet the objectives of this dissertation are presented.

Chapter 4 involves computation of result from the case study. Same chapter also deals with the analysis of the result obtained and its correlation.

Chapter 5, conclusions are drawn based on the present investigations and few suggestions for the further research are given.